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Financial Intermediation and Growth in Developing Countries

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I. Introduction

Accounting for why some countries grow faster than others for long periods of time is a topic that has received considerable attention over the last few decades. It has been extensively studied in McKinnon [1973] and Shaw [1973], and more recently Bencivenga and Smith [1991], Greenwood and Jovanovic [1990], King and Levine [1991] and Pagano [1993]. Although most of the earlier work was based on Robert Solow's neo-classical growth model developed in the 1950s, more recent work, over the last five years or so, uses the newer endogenous growth models. Robert Solow's growth model theorized that a country's level of output depended on its labor force, its stock of capital and a measure for exogenous technological progress. This model had no significant role for financial intermediation in determining growth. Financial intermediation could be linked to the level of capital stock or the productivity level, but not to growth rates. Growth rates were only the result of exogenous technological progress.

Recent insights and techniques has meant that endogenous technological progress can now be incorporated into the model. This paper extends the growth literature by investigating the importance of financial markets on growth rates. It uses an extension of the endogenous 'AK' growth model based on the work by Romer [1989] and King and Levine [1993], to show that growth rates can be related to financial intermediation. In this way using endogenous technological change, it is possible to relate the growth rate to financial intermediation so that financial intermediation has level effects as well as growth rate effects.

Two main relationships between finance and growth are often emphasized: i) the role that financial markets have in channeling savings towards investment and ii) the informational problems that financial markets are able to solve that would otherwise lead to inefficient outcomes. This paper construct a model where prospective entrepreneurs are evaluated by financial markets on their ability to come up with a successful innovation which determines the level of productivity in the economy. With efficient financial

markets loans are made to those who are the most likely to come up with marketable innovations. Because marketable innovations lead to higher growth, countries that have more developed financial systems will have greater growth rates. My work differs from previous work in this area in that it differentiates the effects of the domestic financial markets from those of the foreign financial markets in allowing for the impact of an increasingly global financial system on an economy.

The paper is divided into 7 sections. Section II gives some background on the financial markets in developing countries as some of the countries have started moving towards more liberalized financial markets. Section III then reviews some of the different theoretical models of endogenous growth and financial development, including those by Bencivenga and Smith [1991], Saint-Paul [1990], Levine [1991] and Pagano [1993]. Section IV summarizes the model on which the theoretical work in this paper is based. Specifically, it looks at an endogenous growth model developed by King and Levine [1993] that links finance, entrepreneurs and economic growth. This model is based on the Knightian role[1] of entrepreneurs initiating economic activity and the Schumpeterian view[2] that innovations are induced by a search for temporary monopoly profits, and that financial institutions are important because they evaluate and finance entrepreneurs.

In Section V, I present my model. This model extends the King and Levine model by adding to it variables that separate the effects due to domestic financial markets from those due to international financial markets. The model gives us a better understanding of the implications that an increasingly global financial system has on a developing country's growth rate. Section VI investigates the empirical support for the model. Specifically, it studies the effects of adding various measures of the openness of financial systems to the production function. This section also examines the empirical work of King and Levine and compares different measures of efficiency and size of the financial market. Measures

[1]Frank Knight (1951)
[2]Joseph Schumpeter (1911)

such as financial depth, domestic credit and claims of the private sector are compared against each other. Data from a number of emerging stock markets is also added as a new measure of the size and efficiency of the financial system and to better explain the relationship between the financial development and economic growth. Section VII concludes the paper and discusses the implications of some of the results from the empirical work.

II. Background

Before looking at the history of financial markets in developing countries, it is important to understand the significance of well developed financial institutions and the role that they play in development. Financial services make it cheaper and less risky to trade in goods and services and to borrow and lend. They do so by taking the resources from one group of individuals and providing them to another group who have more productive uses for the resources, thereby raising the incomes of both the saver and the borrower. Although there are other ways of raising capital, such as investment by the public sector or self-financing, unlike market driven financial systems, these investments are not competitively determined. In a competitive financial system, the transaction costs are held down, the risk is allocated to those who are willing to take it and only those who think they can make a profit from borrowing end up investing.

A competitive financial system can take on many forms, including informal finance from pawnbrokers and moneylenders as is the case in many developing countries. However, as economies develop there is a need for services that can only be provided by formal institutions. For example, by transforming the size and maturity of financial assets, formal institutions can mediate between the many small depositors who prefer liquid assets and the large borrowers who need long-term loans for larger projects. A financial system thus contributes to the economy by providing an efficient means of borrowing and lending,

so that an economy with a more developed financial sector will see an increase in investment, and therefore an increase in its growth rate.[3]

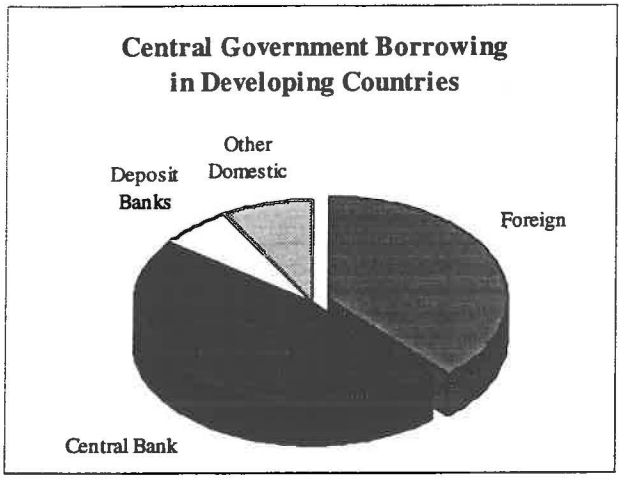
The economies of the developing countries in the 1950s and 1960s were based mainly on the import of manufactured goods and the export of agricultural products. A process of rapid industrialization and agricultural modernization was taking place, and the governments felt that financial market reforms were needed to get the financial sector to support their modernization efforts. At the time, the formal financial sector mainly consisted of a few institutions, usually foreign-owned banks, which only had branches in the major cities and served mainly the large multinational companies. There were few sources of equity and long-term finance for local industries and what was available was expensive. It is not difficult to understand why, as part of their development strategies, many of the governments felt the need to exercise more control over their country's financial sector.

As a result, many governments ended up creating new financial institutions to provide funding at low interest rates to industries in sectors that were important to their development projects. They nationalized their commercial banks and directed them to follow the government's agenda. The governments themselves also borrowed heavily from the domestic financial system and abroad (see figure 1), both to finance government deficits and to meet the needs of state-owned enterprises (SOEs). The banks were directed to open branches in rural areas to provide credit to smaller enterprises. The governments also put credit allocation and interest rate ceilings on both the private and public financial intermediaries.

The effects of these policies were reflected in the damage done to the financial sectors in the 1970s and 1980s. Under government pressures, banks did lend to SOEs and

[3]World Development Report 1989, Financial Systems and Development. The World Bank, Oxford University Press. p. 54-69.

Figure 1:



Source: World Development Report, 1989

priority sectors, at below market interest rates thus not adequately reflecting the risks involved in these industries. With government backing, many of the state enterprises defaulted on their loans. Interest rate controls meant that domestic savers were discouraged from holding financial assets locally and the controls prevented riskier or longer-term investments from being made. In some countries, government and public borrowing from commercial banks crowded out private investment from taking place, while in others rampant inflation was a result of money being created for government investment. For example, in India about half of the bank assets had to be held on reserve to meet the reserve requirements or else held as government bonds, and 40 percent of the remainder had to be lent to priority sectors at controlled interest rates. In Brazil in 1987, government credit programs accounted for more than 70 percent of the credit outstanding to the public and private sectors[4].

Figure 1 shows the breakdown of central government borrowing in developing countries. The majority of borrowing is from the Central Bank where almost 47% of the borrowing is done to finance the deficit. A near second is the borrowing from foreign sources at almost 38%. When compared to developed nations, where most of the

[4]World Development Report 1989, Financial Systems and Development. The World Bank, Oxford University Press. p. 55.

borrowing is from private domestic sources, this shows how dependent developing countries are on foreign private and government borrowing.

Only recently have developing countries begun to acknowledge the problems that their interventionists approach has caused. Their directed credit programs have become non-performing loans. The ability to borrow at cheap rates has encouraged less productive investment. Those who borrowed for projects with low returns were unable to repay while others willingly defaulted knowing that no action would be taken against those in priority sectors. In a sample of eighteen development financial institutions (DFIs) worldwide, on average nearly 50 percent of their loans (by value) were in arrears, and accumulated arrears were equivalent to 17 percent of the portfolio value[5]. Interest rate controls and high inflation have also had adverse affects on financial development. In fact in countries that have maintained low and stable inflation through prudent monetary and fiscal policies, financial growth has been rapid. Malaysia's financial depth (measured as a ratio of M2 to GNP) rose from 31 percent of GNP in 1970 to 75 percent in 1987. On the other hand, Argentina which has suffered from high inflation has seen its financial depth drop from 30 percent of GNP in 1970 to around 18 percent by 1987. Increasingly, developing countries are changing their policies and are moving towards more liberalized economies, as they realize that development of the financial sector requires them to minimize their control over the increasingly complex financial sector and allow the market forces to have greater influential control over interest rates and credit allocation.

III. Literature Review

The relationship between financial intermediation and economic growth has been studied extensively over the last five years. This section reviews the theoretical models and empirical work from a number of different papers that try to explain the potential effects of financial markets on growth. The theoretical review involves work by Pagano

[5]Ibid. p. 60.

[1993], Saint-Paul [1991], Fry[1994], Bencivenga and Smith [1991], Levine [1991] and King and Levine [1993]. Review of empirical work is from King and Levine [1993].

Pagano [1993] gives an overview of the various effects of financial development on growth by examining some ways in which financial markets influence the growth rate of output. First, Pagano looks at the funneling of savings to firms, and explains how in transforming savings to investment, financial markets absorb some of the resources. The fraction that is absorbed goes to the banks and is the spread between the lending and borrowing rates. By reducing this spread through financial development an economy can increase its growth rate. Also, financial markets determine the allocation of funds, and they want to invest in projects where the marginal product of capital is highest. This they do by collecting information to evaluate alternative investment projects and allowing risk sharing so that agents may invest in riskier technologies. Thus there is a more efficient allocation of resources and higher productivity.

Saint-Paul [1991] looks at the relationship between financial development and the growth rate through the impact that financial markets have on technological choice. The reasoning is that a country can achieve higher productivity growth through a greater division of labor, and this specialization will lead to more efficiency and therefore higher productivity growth. The role of the financial markets is to permit this greater division of labor by allowing agents to hold a diversified portfolio, allowing them to spread the risk involved in being more specialized. Without the financial markets there would be less specialization and agents would choose technologies that were easily adaptable to different uses and were therefore less risky. However, the flexible technologies would also mean lower productive growth and may even lead to a more backward state of development in the economy.

The paper uses the linkages between financial markets and technological choice to explain the differing stages of development across countries. It basically says that in countries where financial markets are underdeveloped people choose the more flexible

technologies (as explained above), but in doing this they encounter little risk, meaning that there is no incentive to develop financial markets. On the other hand countries with developed financial markets will have a greater need for financial markets. Thus an economy with a highly developed financial markets will be able to achieve a higher level of development than an economy in which they are not very developed.

Bencivenga and Smith [1991] construct a model where financial intermediaries shift the composition of savings towards capital by reducing the effects of the agents' random liquidity needs. Agents in this model accumulate capital and an unproductive liquid asset. Financial markets reduce unnecessary capital liquidation, through pooling of funds and are able to alter the savings such that it is favorable for capital accumulation. Then because the higher capital accumulation affects the real growth rate, financial markets promote growth. Specifically, they use a three-period-lived overlapping-generations model where each agent has an illiquid investment and a more liquid but less productive investment. The agents who make saving decisions, could have the need to liquidate their assets prematurely for whatever reason. Thus there is an incentive for banks to form and hold liquid reserves that will meet the liquidity needs of the agents based on some predictable withdrawal demand. Finally, they conclude that with the more active banking sector the economy will see higher growth rates.

The article on stock markets and growth by Levine [1991] uses a model similar to that used by Bencivenga and Smith. Levine shows another way in which liquidity risks can be better shared, through the securities market. According to his model an inopportune need for liquidity can be met by selling shares on the stock exchange rather than withdrawing money from a bank. By selling shares, those who need liquidity hand over the risks to other investors who are willing to stay illiquid. The result is that capital is not prematurely withdrawn from the firm. The stock market at the same time also allows agents to reduce their risks by portfolio diversification. This would allow agents to

invest in more illiquid but also more productive projects. In this way, the stock market raises the productivity of investment and therefore the growth rate.

Fry [1994] looks at whether or not there are particular characteristics of small economies that might suggest alternating sequencing or differing emphasis on components in a program of financial sector reform. He uses an endogenous growth model of the form $Y = K^{\alpha} X^{\beta}$, where K represents a combination of physical capital and knowledge and X is a factor such as land or labor. Fry then looks at a number of different policies that need to be followed or sequenced for small economies to have successful financial reform. This, according to Fry, should start with reforming the interest rate regime, to recapitalizing and restructuring financial institutions, developing long-term capital markets and finally to developing foreign exchange markets through more liberalization. He concludes by saying that a number of difficulties remain in trying to reform small developing economies, especially in terms of how much liberalization should take place and how fast this should take place.

The paper by King and Levine [1993] looks at financial markets as increasing the probability of successful innovation and therefore accelerating the rate of economic growth. They develop an endogenous growth model in which they incorporate the role of entrepreneurs in initiating economic activity. Using the idea that innovations are induced by a search for temporary profits and that financial institutions are important because they evaluate and finance entrepreneurs, they develop a model to show the effects on an economy's productivity growth.

The King and Levine model can be broken down into three main steps. First they develop a model for how financial markets make the decision as to which entrepreneurs should be allowed to undertake innovative activity. Next, they link innovation to growth, and finally they derive the equilibrium condition between financial markets and the growth rate.

In linking financial intermediation with innovation King and Levine identify four areas where the services of financial markets are needed to make innovation more efficient. These are i) evaluating the viability of the prospective entrepreneurs projects, as there are large fixed costs involved that require specialized organizations to perform the tasks, ii) the size of the projects means that it is necessary to pool the funds of many small savers, again requiring financial markets, iii) because of the uncertain outcomes from innovation, it is necessary to diversify risks, which financial intermediaries do efficiently, and iv) some mechanism is needed to value the expected profits that any particular innovative activity will have, and once again financial markets can do this most efficiently. In linking innovation to growth King and Levine basically use a model in which innovations are cost reducing and allow an entrepreneur to temporarily reap monopoly profits by producing at a cost that is below that of the industry. In this way the rate of innovations determines the rate of productivity growth and therefore economic growth.

IV. Theoretical Model

In the next few pages, I first review the model developed by King and Levine [1993], before going on in section V to develop a model that incorporates the effects of international financial markets on an economy's productivity. King and Levine, as explained previously, base their work on the Schumpeterian model of financial intermediation, which divides up the role of financial services into those of entrepreneurial selection and the provision of finance from a pool of savings.

We start with the assumption of an economy with many individuals, with N units of time and financial wealth, which is a claim on the profits of firms. The financial intermediaries first need to determine which of the prospective entrepreneurs are to be funded. Each prospective entrepreneur has a project (that needs to be funded) and has the skills to manage the project capably with a probability α. So the first task of the financial intermediaries is to determine which individuals are the most capable of handling their

projects. This can be determined at a cost of f units of labor. If w is the wage rate then wf will be the cost of evaluating a prospective entrepreneur. Now if the market value of a rated entrepreneur is q then in a competitive financial market the zero profit condition is

$$\alpha q = wf \qquad (1)$$

So the expected income from rating an entrepreneur, αq, must equal the cost of evaluating the prospective entrepreneurs, wf.

A rated entrepreneur then needs to realize a marketable innovation. For this the entrepreneur requires x units of labor, and at the end can expect to have a successful innovation with probability π. A successful innovation would mean that the entrepreneur will capture monopoly profits, and so we can look at the present value of the returns as $\rho_{t+\Delta t,t} v_{t+\Delta t}$ where ρ is the discount factor at time t for cash flows at $t+\Delta t$ and v is the future stock market value of the firm, at time $t+\Delta t$. Expected returns to the financial intermediary would then be $\pi\rho v' - wx$. Adding a tax rate τ on the gross income of the financial intermediary, we can incorporate (1-τ) as the fraction of the total expected returns that are the financial intermediary's income stream from financing the firm. Thus the value of a rated entrepreneur can be given by the innovation rent specification as

$$q = (1-\tau)\pi\rho v' - wx \qquad (2)$$

So in equation (2), the return to the financial intermediary is equal to the present value of the expected profits after taxes less the total cost of innovation.

Combining the two forms of the equation for the rated entrepreneur gives the following equilibrium condition for equations (1) and (2). Substituting for q in both the equations and solving for the expected revenues from the activity we get

$$\alpha[(1-\tau)\pi\rho v' - wx] = wf$$

$$\pi\rho v' = \frac{w(f+\alpha x)}{\alpha(1-\tau)}$$

$$\pi\rho v' = \frac{w(f/\alpha + x)}{1-\tau}$$

and so the equilibrium in the financial intermediary sector requires

$$\pi\rho v' = wa(\tau), \qquad (3)$$

where $a(\tau) = (f/\alpha + x)/(1-\tau)$ and is a combination of the full labor requirements for an innovation project given by $a(0) = (f/\alpha + x)$ and τ is the tax on entrepreneurial activity, and can be in the form of explicit financial sector taxes or those arising from distortions in the financial sector. Labor requirements can be broken down into two parts. The f/α is the labor necessary to evaluate prospective entrepreneurs divided by the probability of selecting the entrepreneurs, and x is the incumbent firm's labor requirements. Thus equation (3) says that in equilibrium the expected market value of the firm (LHS of the equation) is equal to the combined costs of intermediation, innovative activity and tax on the financial intermediaries.

In this model an innovation at time t means that the entrepreneur will capture monopoly profits from the innovation, equal in value to the stock market value of the monopolist. But this also means that there will be a corresponding capital loss on the currently dominant firm. If we take v_t to be the *current* stock market value of an incumbent firm (prior to distribution of dividends δ_t), then the equilibrium condition for holding a share of stock from time t to $t+\Delta t$ is

$$(1-\Pi)\rho_{t+\Delta t,t} v_{t+\Delta t} = v_t - \delta_t \qquad (4)$$

letting Π represent the probability that *some* entrepreneur will successfully innovate, the above expression can be looked at as the current value of the firm (on the RHS) equaling the expected value of the present value $\rho_{t+\Delta t,t} v_{t+\Delta t}$ of the firm, taking into account capital losses Π.

To explain the link between financial intermediation and productivity growth through technology, King and Levine develop a Schumpeterian model of technological

progress. They start with an economy with a continuum of products indexed by ω on the interval $0 \leq \omega \leq 1$, which are subject to technological improvements. Productivity levels are given by Λ such that innovations by entrepreneurs move the products technology up a ladder with steps j=0,1,..., giving higher levels Λ^j of productivity. The technological innovations only apply to intermediate goods production, which are all inputs into a single final good, C_t.

If $y_t(\omega)$ is the physical output of the intermediate product ω, A_t is the level of productivity at time t in industry ω, and $n_t(\omega)$ is the level of labor input, then we can see that $y_t(\omega) = A_t(\omega)n_t(\omega) = \Lambda^j n_t(\omega)$. Now with a wage rate of w_t the unit costs are

$$\frac{w_t n_t(\omega)}{y_t(\omega)} = \frac{w_t}{A_t(\omega)} = \frac{w_t}{\Lambda^j}$$

Since the lead firm in the industry produces at a cost lower than other firms (as explained above), then we can assume that by pricing its products at its rivals' costs, the lead firm will still make a profit. So if the price of the intermediate good is given by $p_t(\omega)$, then the factor demands are $z_t(\omega) = C_t / p_t(\omega)$, where C_t is the final good produced, such that the output of all the intermediate goods $y_t(\omega)$, are inputs to the final good. Thus the lead firm's costs are $w_t / A_t(\omega)$ and it charges a price of $p_t = \Lambda w_t / A_t(\omega)$ based on markup from its costs. The stream of profits earned by the lead firm are

$$\delta_t(\omega) = p_t(\omega) y_t(\omega) - w_t n_t(\omega),$$
$$\delta_t(\omega) = \frac{\Lambda w_t}{A_t(\omega)} A_t(\omega) n_t(\omega) - w_t n_t(\omega),$$
$$\delta_t(\omega) = m w_t n_t(\omega) \quad \text{where } m = (\Lambda\text{-}1) \text{ or the net markup.}$$

The above framework can be summarized by showing how the aggregate productivity growth at a time $t + \Delta t$ depends on the productivity growth at a time t and on the probability of someone successfully innovating

$$A_{t+\Delta t}(\omega) = \begin{cases} A_t(\omega)\Lambda & \text{with probability } (\Pi)\Delta t \\ A_t(\omega) & \text{with probability } (1-\Pi)\Delta t \end{cases} \qquad (5)$$

We now look at the general equilibrium for the model. This splits the problem into a production-side relation, which looks at the linkages between interest rates and growth and a preference-side relationship which looks at the optimal consumption choice. Production-side relationships are identified by three equilibrium conditions: the financial intermediation equilibrium conditions, the stock market equilibrium conditions and the labor market equilibrium conditions. The financial equilibrium conditions are derived from those given above, as follows. Equation (3) can be written as

$$\pi v_t = a(\tau)w_t, \qquad (6)$$

since $\rho_{t+\Delta t,t} v_{t+\Delta t}$ is the present value of the future stock price of the firm and this is the same as the value of the firm today, v_t. Also, from equation (4) it follows that

$$dv_t/dt = \Pi v_t - \delta_t + r_t v_t \qquad (7)$$

where r is the instantaneous real interest rate, such that $\rho_{t+\Delta t,t} = \exp(r_t \Delta t)$, and dv_t/dt is the time derivative of the stock price.

The labor market equilibrium is defined to be

$$n + a(0)e = N, \qquad (8)$$

where N, the total stock of labor, is allocated between n, the quantity of labor required for production of the intermediate goods, and $a(0)e$, the quantity of labor involved in financial intermediation and innovation.

The stock market equilibrium can be determined using the assumption that stock prices will grow with dividends at the rate of productivity growth γ. Thus we can add the condition that the growth rate of the stock market value of the firm, $dv_t/dt = \gamma v_t$. By combining the above condition with (7) we get the following stock market equilibrium condition

$$v_t\gamma = \Pi v_t - \delta + rv_t,$$

or
$$v_t = \delta/(r-\gamma+\Pi) \qquad (9)$$

With r, δ and Π as fixed, one can see that an increase in the growth rate, γ tends to raise the stock market value of the firm.

Now we can determine the production side relationship for the equilibrium condition based on the three equilibrium conditions given above. By combining the above equations with the assumption that the total innovation probability Π depends on πe, and using the profit condition for pricing intermediate goods, $\delta_t(\omega) = mw_t n_t(\omega)$, also given above, we derive the equilibrium production-side relation starting with equation (6):

$$a(\tau) = \frac{\pi v}{w}$$

$$a(\tau) = \pi\frac{\delta/w}{r-\gamma+\Pi} \qquad \text{from (9)}$$

$$a(\tau) = \pi\frac{\delta/w}{r-\gamma+(\gamma/\lambda)} \qquad \text{since } \gamma = \Pi\lambda \text{ from (5)}$$

$$a(\tau) = \pi\frac{\delta/w}{r-(1-1/\lambda)\gamma}$$

$$a(\tau) = \pi\frac{mn}{r-(1-1/\lambda)\gamma} \qquad (10)$$

where $\lambda=\log(\Lambda)$. Using $\Pi=\pi e$, $n+a(0)e=N$ and $\gamma=\Pi\lambda$, and solving equation (10) for the interest rate we get the following

$$a(\tau)[r-(1-1/\lambda)\gamma] = \pi mn$$

$$r = \frac{\pi mn}{a(\tau)} + (1-1/\lambda)\gamma$$

$$r = \frac{\pi m(N-a(0)e)}{a(\tau)} + (1-1/\lambda)\gamma$$

$$r = \left[\frac{\pi m(N-a(0)e)}{a(0)}\right](1-\tau) + \frac{\lambda-1}{\lambda}\gamma$$

$$r = \left[\frac{\pi mN}{a(0)} - e\pi m\right](1-\tau) + \frac{\lambda-1}{\lambda}\gamma$$

$$r = \left[\frac{m\bar{\gamma}}{\lambda} - \Pi m\right](1-\tau) + \frac{\lambda - 1}{\lambda}\gamma$$

$$r = \frac{m}{\lambda}(1-\tau)\bar{\gamma} - \Pi m(1-\tau) + \gamma + \frac{1}{\lambda}\gamma$$

$$r = \left[1 - \frac{1}{\lambda} - \frac{m}{\lambda}(1-\tau)\right]\gamma + \left[\frac{m}{\lambda}(1-\tau)\right]\bar{\gamma} \qquad (10')$$

where $\bar{\gamma}$ is the maximum feasible growth rate, defined by $\bar{\gamma} = N\lambda\pi / a(0)$. Equation (10') clarifies the relationship between the tax rate τ and the interest rate r for any given growth rate. When the growth rate is $\gamma = \bar{\gamma}$, then the interest rate is $r(\bar{\gamma}) = (1 - 1/\lambda)$ for all tax rates, and similarly when the growth rate is zero we get $r(0) = (m/\lambda)(1-\tau)$, so that an increase in τ lowers the intercept on the r axis. Thus, as shown in figure 2, there is an unambiguous inverse relationship between the real return, r and the tax rate, τ.

Next we determine the preference side relationship of our equation. The preferences are based on the savings behavior of an immortal family with a utility function of the form $U_t = \int_0^\infty u(c_{t+s})e^{-\varphi s}ds$. There are two parameters that describe the inter-temporal preferences: the inter-temporal elasticity of substitution in consumption, $1/\sigma$, and the rate of time preference, φ. So the preference side relation between r and γ is given by

$$\gamma = [r - \varphi]/\sigma, \qquad (11)$$

Using equations (10) and (11), we can now determine the equilibrium growth rate as

$$\gamma\sigma + \varphi = \left[1 - \frac{1}{\lambda} - \frac{m}{\lambda}\bar{\gamma}(1-\tau)\right]\gamma + \left[\frac{m}{\lambda}(1-\tau)\right]\bar{\gamma}$$

$$\gamma\left[\sigma - 1 + \frac{1}{\lambda} + \frac{m}{\lambda}\bar{\gamma}(1-\tau)\right] = \frac{m}{\lambda}\bar{\gamma}(1-\tau) - \varphi$$

$$\gamma = \left[\frac{m}{\lambda}\bar{\gamma}(1-\tau) - \varphi\right] \Big/ \left[\sigma - 1 + \frac{1}{\lambda} + \frac{m}{\lambda}\bar{\gamma}(1-\tau)\right] \qquad (12)$$

The growth rate thus depends on a number of factors. On the preferences side it is higher for lower φ, i.e. discounting the future less or for lower σ which means more willing to substitute through time. Also growth is higher when the economy is more productive, and

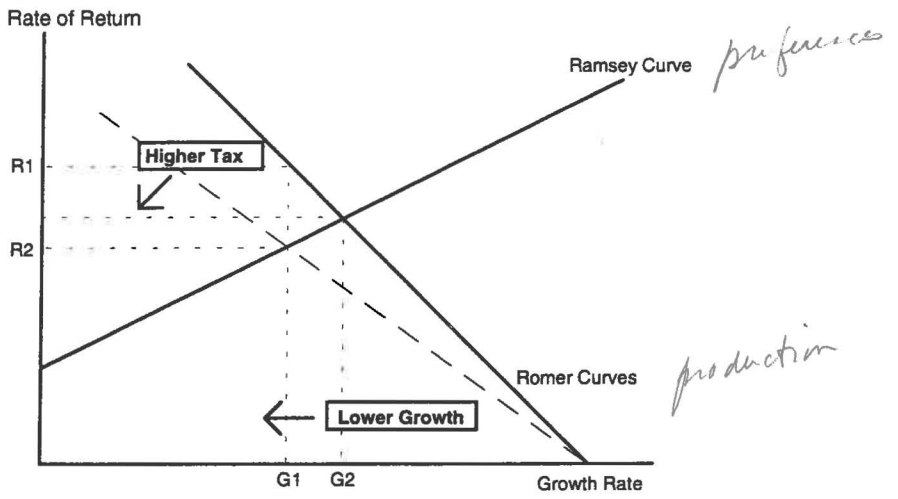
it depends positively on the extent of markups *m* and negatively on the losses on investors due to innovations ($1/\lambda$). The parameter τ is the real variable of interest in the above equation and this can be used to study the links between the development of the financial sector and the growth rate.

King and Levine [1993] break down the effects of the financial taxes τ into explicit and implicit financial sector taxes. Examples of explicit taxes include taxes on the gross receipts of banks, value added taxes, taxes on loan balances, taxes on financial transactions and taxes on intermediary profits. Implicit taxes include non-interest bearing reserve requirements, forced lending to state enterprises and to industries in priority sectors, and interest rate ceilings on various loans and deposits. The interaction of the taxation with the real return and the growth rate is described below.

Figure 2 shows the interaction of the upward sloping preference-side or Ramsey curve and the Romer curves on the downward-sloping production side. The preference side Romer curve is fairly straight forward in showing that a higher φ, representing more impatience, would move the curve upward, and a higher value of σ for more risk averse individuals would steepen the curve by rotating it about its intercept.

The production side shows two Romer curves, representing the zero-cost or gross Romer curve, the solid downward sloping curve, and the dashed curve representing the effect of including a cost of financial intermediation into the production-side relationship. Starting from the solid curve and moving it downward, it is evident from the illustration that the effect of this would be to lower growth as the tax rate is increased. This can be seen from looking at the section W in the dashed Romer curve. This shows a that there is a cost to financial intermediation that creates a wedge between the return to savers [R2] and the cost to the investors [R1]. Thus the cost of intermediation is to reduce the growth rate from [G2] to [G1]. So the way to increase growth is by reducing the size of the wedge. This means reducing the cost of financial intermediation and moving to a steeper

Figure 2: Financial Intermediation Costs, Growth, and Rates of Return



Source: Sequencing Financial Sector Reform and Development in Small Economies, Fry M., 1994

Romer curve through increased financial development. In this way, a lower cost of financial intermediation would result in a higher growth rate.

One way to reduce the cost of financial intermediation and thereby move the Romer curve back up is through foreign intermediation. By introducing foreign banks into the economy we can see the effect that these would have on the cost of financial intermediation and therefore the growth rate. The next section incorporates the role of foreign financial intermediaries into the model to see the role that these play in the development of the economy.

V. Extensions to the King & Levine Model

Using the model from the previous section I now go on to separate the effects of domestic financial markets from those of international financial markets. In modifying the original model to include some measure of how foreign financial markets may increase economic development by providing some of the services, I changed the labor market equilibrium condition, equation (8) to reflect the fact that international financial markets

allow more labor to be directed towards the actual production of goods and towards innovative activity, by reducing the amount of labor resources needed in financial intermediation. Some of the resources that were originally used in the domestic financial intermediaries would now be unnecessary since foreign financial intermediaries would absorb part of their activities of evaluation, resource pooling, etc. Thus the new labor market equilibrium can be represented by the following equation

$$n+\beta(f/\alpha)e+xe=N \qquad (13)$$

where β is the fraction of financial intermediation resources that are supplied by labor in the domestic financial markets. Thus the total labor, N is allocated as follows: n, as before, is the labor required for production. However, the labor requirements of financial intermediation would only be a fraction β of the original requirement, thus giving the $\beta(f/\alpha)e$ term. Also, xe (labor required for innovation) remains the same as innovative activity still requires the same amount of labor as before.

Adding the above to the production-side equilibrium relationship, starting with equation (10) to solve for the interest rate using the new labor market equilibrium condition, we get

$$a(\tau)[r-(1-1/\lambda)\gamma]=\pi mn,$$
$$a(\tau)r=\pi mn+a(\tau)(1-1/\lambda)\gamma,$$
$$r=\frac{\pi mn}{a(\tau)}(1-\tau)+(1-1/\lambda)\gamma$$

Substituting (13) for n:

$$r=\frac{\pi m(N-\beta[f/\alpha+x]e)(1-\tau)}{f/\alpha+x}+\frac{\lambda-1}{\lambda}\gamma$$
$$r=\left[\frac{\pi mN}{f/\alpha+x}-\beta e\pi m\right](1-\tau)+\frac{\lambda-1}{\lambda}\gamma$$

Using the maximum feasible growth equation ($\bar{\gamma}=N\lambda\pi/a(0)$) from section IV to substitute for N and from the fact that $\Pi=\pi e$ we can simplify the equation to

$$r = \left[\frac{m\bar{\gamma}\beta}{\lambda} - \beta m\Pi\right](1-\tau) + \gamma - \frac{\gamma}{\lambda}, \qquad (14'')$$

$$r = \beta(1-\tau)\left[\frac{m\bar{\gamma}}{\lambda} - \frac{m\gamma}{\lambda}\right] + \gamma - \frac{\gamma}{\lambda}, \qquad (14')$$

$$r = \left[1 - \frac{1}{\lambda} - \frac{\beta m}{\lambda}(1-\tau)\right]\gamma + \left[\frac{\beta m}{\lambda}(1-\tau)\right]\bar{\gamma} \qquad (14)$$

This equation is similar to equation (10'), the difference being of course the variable β that shows up in γ and $\bar{\gamma}$. Although equation (14) better summarizes the overall effect of the variables in a form that is similar to equation (10'), the effect of β is probably better explained by the previous one, equation (14'). Here the effect of the variable β can clearly be seen as positively related to the real interest rate. This means that with a higher fraction of domestic financial intermediation, the real interest rate rises. The effect of the other variables on the β variable can also be determined from this equation. The impact of β is increased with a smaller tax rate on financial intermediation, since a smaller tax rate means a higher value of $(1-\tau)$. Also a higher value of the difference between the maximum feasible growth rate $\bar{\gamma}$ and the growth rate of output γ would increases the value of the β, meaning that the greater the potential for growth in the economy the higher will be the effect on the interest rate through more domestic intermediation. The positive relation between the domestic financial intermediation and the real interest rates seems to imply that for higher levels of β, there will be more capital inflows because of higher interest rates. This can be understood best if we recognize that for capital inflows to take place at all, there need to be some level of domestic financial sector services available to channel the inflow of funds, whether the funds are from foreign financial intermediaries or from foreign governments.

The rate of change of the real interest rate with respect to the fraction of domestic intermediation can be derived as

$$\frac{\partial r}{\partial \beta} = \frac{m(1-\tau)(\bar{\gamma}-\gamma)}{\lambda} \quad (15)$$

From this we see that the rate of change of the r with respect to β increases with a higher markup value. It also increases with a lower tax rate and a lower level of productivity. Interestingly, the second derivative is zero, so that the relationship between the real interest rate and the domestic financial intermediation value will be a linear one.

Next we determine the new equilibrium growth rate for the economy, starting with the preference side growth rate of output, equation (11), and substituting equation (14), the new interest rate equation which includes the derivation using the variable β, into this equation, we get

$$\gamma = \frac{1}{\sigma}\left[1-\frac{1}{\lambda}-\frac{m\beta}{\lambda}(1-\tau)\right]\gamma + \frac{1}{\sigma}\left[\frac{m\beta}{\lambda}(1-\tau)\right]\bar{\gamma} - \frac{\varphi}{\sigma}$$

$$\gamma\left[1-\frac{1}{\sigma}\frac{\lambda-1-m\beta(1-\tau)}{\lambda}\right] = \frac{m\beta}{\sigma\lambda}(1-\tau)\bar{\gamma} - \frac{\varphi}{\sigma}$$

$$\gamma[\sigma\lambda-\lambda+1+m\beta(1-\tau)] = m\beta(1-\tau)\bar{\gamma} - \lambda\varphi$$

$$\gamma = \frac{m\beta(1-\tau)\bar{\gamma} - \lambda\varphi}{\sigma\lambda-\lambda+1+m\beta(1-\tau)} \quad (16)$$

The β term shows up both in the numerator and the denominator in equation (16) and so it not immediately clear what the effect of β is on the growth rate of output. It can probably be better understood from the interaction of the different variables in the equation. I first review each of the variables in equation (16) and then try and look at possible effects of the β variable on growth of output.

On the preference side, the variable φ measures the rate of time preference, while $1/\sigma$ measures the inter-temporal elasticity of substitution in consumption. From the production side, the variable m, for the mark up of the lead firm in the industry, the tax rate τ, the level of productivity λ, and the share of domestic financial intermediation β, effect the growth rate of output. Dividing up the two terms in the numerator we get

$$\gamma = \frac{m\beta(1-\tau)\bar{\gamma}}{\sigma\lambda - \lambda + 1 + m\beta(1-\tau)} - \frac{\lambda\varphi}{\sigma\lambda - \lambda + 1 + m\beta(1-\tau)} \qquad (17)$$

Thus the value of β will depend on the relative sizes of the terms $m\beta(1-\tau)\bar{\gamma}$ and the λv in the equation, so that the effect of the domestic financial variable β on the growth rate is indeterminate, and depends on the size of the variables in equation (17). Looking at the rate of change of the growth rate of output, γ with respect to the share of domestic intermediation activity β,

$$\frac{\partial\gamma}{\partial\beta} = \frac{m(1-\tau)(\bar{\gamma} - \bar{\gamma}\lambda + \bar{\gamma}\lambda\sigma + \lambda\varphi}{(1-\lambda+\lambda\sigma+\beta m-\beta m\tau)^2}, \quad = \frac{m(1-\tau)(\bar{\gamma}(1-\lambda)+\lambda(\bar{\sigma}+\varphi))}{(18)} > 0$$

we find that the β term only appears in the denominator and is squared, so that the effect of the variable is to always decrease the growth rate. So while we may not know the effect of the actual variable β on the growth rate, because of the first derivative it is clear that there will be diminishing returns for higher values of β.

In the next section I use the models derived in this and the last section, to test some of the effects of financial markets on developing country growth rates. I first look at the model in equation (12), that takes into account only the effects of domestic financial markets. The effect of the variable τ is measured by using proxies to measure the effects of the efficiency of financial markets on the growth rate. Then, as in the theoretical model, I include other variables that could be used to measure the effects of foreign intervention in the financial sector and the proxies for the variable β are used to determine how the growth rate is effected by a combination of domestic and foreign financial intermediation.

VI. Empirical Linkages between Finance and Growth

The following pages cover some of the empirical work done to determine i) the linkages between different measures of the financial system and growth, ii) the link between foreign financial intermediation and the growth rate, and iii) look at some emerging stock market data to see the effect of some of the more efficient measures of financial indicators on the growth rate in developing countries. Although there are a number of problems in doing a study of the financial sector, the use of a number of techniques in this way allows us to better determine the relationship between financial intermediaries and growth. A number of different regressions are covered in the next few pages to give a better understanding of the interactions between financial markets and growth.

6.1 Base Measures of the Financial System

The first part of this section reviews and extends the work done by King and Levine [1993] in examining the links between financial development and growth. It examines four different measures of financial development that cover a broad range of indicators looking at the state of the financial markets and the government policies towards these financial systems. Since the main problem in this type of a study of the financial sector is in constructing unambiguous measures of the state of the financial markets and the government policies towards financial activities, the use of four different financial indicators solves this problem and therefore allows a better understanding of the relationship between financial intermediation and growth.

Although the four financial indicators used in this study are the same as those used by King and Levine [1993], the production function used is based on a composite of physical and human capital as in Lucas [1988], rather than the more primitive model of productivity only dependent on the capital stock that is used by King and Levine. Thus, using this method for the empirical work that explicitly includes both a physical capital and

a human capital variable I was able to find improvements over the results from King and Levine for the given financial indicators.

The data used in consists of a pooled cross-country, time-series sample of 70 developing economies[6] with data from 1970-1989. The four indicators can formally be defined as follows:

DEPTH The ratio of liquid liabilities of the financial system to GDP. Liquid liabilities equal M1 plus interest bearing liabilities of the banking system, plus demand and interest bearing liabilities of the "non-bank" financial intermediaries. IFS line 551, or IFS lines 34+35.[7]

BANK The ratio of deposit bank domestic credit divided by deposit bank domestic credit plus central bank domestic credit. IFS lines 22/(12+22).[8]

PRIV/Y The ratio of claims on the private sector by the Central Bank and Deposit Money Banks to GDP. IFS line 32d.[9]

PRIVATE The ratio of claims on the non-financial private sector by the central bank and deposit banks to total domestic credit. IFS lines 32d/(32d+32a+32b+32c+32f).[10]

The measures above along with the other variables used in the regression were all averaged over 10 year periods giving two observations per country for the period from 1970-1989. The first variable DEPTH, is a commonly used measure of the overall financial depth in an economy. It is essentially a measure of the amount of M2 money and the intuition behind using it as a measure of the size of the financial sector comes from the assumption that there is a positive correlation between the size of the financial sector and the services that it provides. Thus the more money in the economy, the greater the need

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[6]See appendix A for a list of countries in the sample. Not all countries are included for all four measures of financial intermediation, due to lack of data for certain financial indicators.
[7]Source: Financial Indicators and Growth in a Cross Section of Countries, King R. and Levine R., World Bank working paper. p.6.
[8]Ibid.
[9]Ibid.
[10]Source: King and Levine data set discription file.

for services to channel that money properly and therefore the greater the size of the financial sector.

The DEPTH measure though clearly leaves something to be desired, as the channel through which it is assumed to have an effect is not well defined. By using the BANK variable it is possible to see the effect of deposit bank assets as a ratio of both deposit banks and the central bank assets. Since central banks are not likely to be involved in the sort of financial intermediation activities that we look at, then BANK should provide a better measure of the financial development in a country, as it essentially looks at the relative importance of commercial banking to central banking.

The other two measures PRIV/Y and PRIVATE essentially measure the share of the total financial intermediation activities that are allocated to the private sector. A financial system where all the resources are funneled to the development of the public

Table 1
Summary Statistics for Regression Variables[a]

Variable[b]	Mean	Std. dev.	Minimum	Maximum
GY	0.039	0.029	-0.025	0.147
GL	0.024	0.007	0.002	0.040
GK	0.020	0.019	-0.019	0.081
DEBT[d]	0.501	0.459	0.068	3.376
GDEBT[d]	0.099	0.070	-0.053	0.336
DEBTSQ[d]	0.460	1.182	0.005	11.398
CURAC[d]	-0.048	0.054	-0.289	0.141
DEPTH	0.304	0.250	0.029	1.586
BANK[c]	0.619	0.189	0.161	0.963
PRIVATE[c]	0.495	0.201	0.051	0.916
PRIV/Y	0.172	0.122	0.021	0.691

[a] Data from 70 country sample using 2 observations for each 10-year average (1970-89).
[b] GY = Real GDP Growth Rate,
GL = Labor participation Growth Rate,
GK = Capital stock Growth Rate.
[c] Use only a 62 country sample due to lack of data for PRIVATE and BANK.
[d] Variables explained in sub-section 6.2.

Table 2
Correlation between Regression Variables[a]

Variable	GY	GL	GK	Depth	Bank	Priv/y	Private
GY	1.000						
GL	0.154	1.000					
GK	0.358	0.004	1.000				
Depth	0.086	0.241	0.099	1.000			
Bank	0.252	0.251	0.257	0.325	1.000		
Priv/y	0.183	0.130	0.084	0.758	0.494	1.000	
Private	0.187	0.054	0.151	0.163	0.783	0.547	1.000

[a] Using 1970-89 period.

owned sector, to provide funding for SOEs, would probably not have the desired effect. So these variables explain how the asset distribution by the financial system between the public and private sectors will increase growth. Thus, in countries where more of the credit is allocated to the private sector, as opposed to government and SOEs one would expect to see more development. Specifically, PRIV/Y looks at the credit allocated to the private sector as a share of the GDP, while PRIVATE looks at the ~~distribution~~ of credit from ~~the government and the public sector~~ to the private sector. It should be noted that these measures may actually only be indicators of the relative size of the private sector, rather than any meaningful measure of the financial sector performance.

Using the above measures as the various indicators of financial markets in developing countries, I then proceeded to estimate the effect of the financial indicators on the GDP growth rate of the pooled cross-section, time series data. Using ordinary least squares to relate the growth rate of GDP (GY), to the growth rate of the labor force participation (GL), the growth rate of the capital stock (GK), and a variable for the financial indicator (in the regression below DEPTH is used), along with an average for the secondary school enrollment rates (SEC), a dummy variable for Africa, and a measure of the number of assassinations (ASSASS):

$$GY = \underset{(1.429)}{0.445}(GL) + \underset{(3.926)}{0.489}(GK) + \underset{(2.421)}{0.025}(DEPTH) - \underset{(-2.969)}{0.041}(SEC) - \underset{(-4.252)}{0.013}(AFRICA) - \underset{(-2.389)}{43.7}(ASSASS)^*$$

$R^2 = 0.254$

*(t-statistics are given in parenthesis below coefficients)

The complete regression results are given in tables B.1 to B.4 in appendix B[11]. Table B.1 shows various regressions using DEPTH as a measure of the size of the financial sector. In each of the regressions in this table, the financial variable is significant (at the 0.1 significance level for a two-tailed t-test) once we control for Africa, the secondary school enrollment rates and assassinations. While the panel data given in regressions (1) and (2) provides a good overview, the real differences between the variables show up mainly between regressions (3)-(4) and (5)-(6), which are separate cross-section regressions on the 1970-79 and 1980-89 data respectively. It is interesting to note that while financial depth had a large and significant effect on growth in the 1970-79 decade, this effect becomes insignificant in the 1980-89 decade. This means that overall financial depth decreased as we moved from the first decade to the second. On the other hand, looking at table B.2, which uses the BANK variable (which measures the relative importance of the commercial and central banks) as the financial indicator, it is evident that BANK is insignificant in the 1970-79 decade, but becomes significant in the 1980-89 decade. This means that while the measure of DEPTH showed a decrease in the total effect of the financial sector from one decade to the next, the BANK variable showed that the role of banks increased from the 1970 decade to the 1980 decade in its effect on the growth rate. Interestingly, the growth of capital is also much higher in the 1980 decade, showing again that the share of private banking has an important effect on growth. It is also worth noting the dramatic change in the value of R^2, in both tables B.1 and B.2 from the first decade to the second, where it changes from about 0.2 to 0.45.

[11]When referring to the regressions from appendix B in the following pages, I refer to the regressions that control for africa, asssassinations and secondary school rates, unless otherwise noted.

Tables B.3 and B.4 look at separating the effect of the private sector side involvement in financial development. The PRIV/Y variable is significant for the cross-section, time series sample and for the 1980 decade. Thus the effect of the financial indicator is more pronounced in the second decade. As with the BANK variable the higher effect of PRIV/Y comes about due to the there being a higher share of the financial intermediation being done by private banks, and this is more so in the 1980 decade, as opposed to the decade before. Also once again the R^2 value is much higher for 1980-89 than for either the panel data or the 1970-79 data, showing that not only is the effect of PRIV/Y larger and more significant for this period but that the ~~data also better fit for the~~ model. The PRIVATE variable, which looks at ratio of claims on the non-financial private sector gives similar results. The 1970 decade variable is insignificant, while the 1980 decade is significant at the 0.1 significance level. In both tables, the financial variable has a ~~higher~~ larger contemporaneous effect in the pooled regression (1970-89), than in the second decade alone. This would imply that the effect as a whole on the growth rate is greater than it is separately for each of the decades.

All four of the measures used show a significant and positive effect on the growth rate, when the pooled data set is used. This clearly shows that there is a relationship between the rate of growth of GDP and the different financial indicators. First, the inclusion of a measure of secondary school enrollment rates, a dummy variable for Africa and a measure of political stability have a significant effect on the results. Second, all the pooled sample measures are significant, and the decade measures are significant either for one decade or the other. In fact the R^2 is much higher for the regressions in the 1980s decade than for the 1970s decade in every case, showing that changes in these variables in the 1980s had an significantly differing effect on the growth rate. The reason for this, as explained earlier, is because of the shift from financial intermediaries directing credit to SOEs in the 1970s to a move towards more lending to the private sector in the 1980s, as is reflected in the data. Third, the inclusion of the growth of capital variable has a

significant and positive effect, and the results using this model specification of the production function gives us better results than would have been obtained by King and Levine [1993] using similar data. Overall these results provide fairly convincing evidence of both the overall positive effect of the financial intermediaries on the growth rate over the two decade pooled sample, and the separate decade effects of different measures of the financial intermediation.

6.2 Incorporating Foreign Financial Intermediation

This sub-section examines three different measures of foreign financial intervention into a developing country economy and its effect on the growth rate. From the model derived in section V, the relationship between the measure of local financial intermediation β, (a fraction that measures the share of local financial intermediation offered), and the growth rate was determined. In this section, I use the variables for financial intermediation from the previous section and include other variables that incorporate the effect that foreign investments through the use of foreign financial intermediaries have on the GDP growth rate. The three variables that are used are the total external debt, growth of debt and the current account deficit, and can be defined as follows:

DEBT: The ratio of total external debt to GDP. The debt statistics are presented by type of borrower instead of type of creditor. The source of the data is the World Bank World Debt Tables from the Socio-economic time-series access and retrieval system.

GDEBT: This is calculated from the DEBT statistic above, and is simply the growth rate of the total external debt.

CURAC: This is the sum of the net exports of goods and nonfactor services, net factor service income, and net private transfers. Source is the World Bank World Debt Tables.

The same data set that was used in sub-section 6.1 was used in the regressions below adding DEBT, GDEBT and CURAC as measures of foreign financial intermediation. I

Table 3
Correlation between Regression Variables[a]

Variable	GY	GL	GK	Debt	GDebt	CurAc	DebtSq
GY	1.000						
GL	0.127	1.000					
GK	0.357	-0.034	1.000				
Debt	-0.317	0.162	-0.247	1.000			
GDebt	-0.134	-0.024	-0.045	0.009	1.000		
CurAc	-0.234	-0.124	0.139	-0.615	-0.189	1.000	
DebtSq	-0.266	0.106	-0.209	0.905	0.074	-0.574	1.000

[a] Using 1970-89 period.

used the same pooled cross-sectional time-series data with the 70 country sample and included the DEPTH and PRIV/Y variables into each of the equations (as measures of domestic financial intermediation), and this allowed me to take into account the effect of both the domestic and foreign financial intermediation on development.

The use of the DEBT variable is essentially a proxy for the amount of capital inflows into a developing country economy. Measuring the amount of accumulated debt for an economy means measuring the net accumulation of capital. The assumption that the loans, of which the debt is composed of, are used for development purposes, means that if these resources are properly allocated to entrepreneurs through the financial sector (as described in the theoretical model), then the use of this proxy should say something about the growth of the economy. However, because this is a measure of accumulated debt, it may not reflect the year to year capital flows. For example, a country with a high level of accumulated debt which may no longer be gaining the benefits of that money will still show a high value for DEBT. For this reason I have also used a measure of the growth rate of the debt, to see the year to year changes in the debt and so how the flows rather than the accumulated levels of capital effect the growth rate. The current account balance is simply another way to measure the same thing.

Table 4
Growth and Foreign Financial Intermediation, 1970-89

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
DEBT average	-0.013	-0.011				
	(-2.343)	(-2.061)				
Growth of DEBT average			-0.051	-0.057		
			(-1.530)	(-1.690)		
Current account					0.070	0.076
					(1.558)	(1.708)
DEPTH average	0.026		0.025		0.023	
	(2.502)		(2.375)		(2.168)	
PRIV/Y average		0.044		0.050		0.045
		(2.050)		(2.313)		(2.095)
R^2	0.286	0.274	0.268	0.266	0.268	0.267

Other dependent variables: Growth of labor, growth of capital, secondary school enrollment rates, Africa dummy variable and index for assassinations. Growth of GNP used as the dependent variable.

Table 4 gives the important results for all the pooled cross-section time-series data sample. The total external DEBT variable is significant (at the 0.05 level) with either the DEPTH and PRIV/Y variable included as the measure of domestic financial intermediation[12]. The DEBT variable has a negative coefficient, implying a 1.3% and a 1.1% negative effect on the growth rate. Similarly, the variables for the growth of debt is negative, also showing that there is a negative effect on the growth of GDP from a higher level of inflows. The current account balance shows a positive effect, but this again means a negative effect on the growth rate since a positive value here corresponds to a negative value for capital account inflows. In each of the cases, the domestic financial intermediation variables are significant at the 0.05 or higher level. This means that controlling for foreign inflows, the measures financial intermediation show a strong positive effect on the growth rate.

[12]Most of the other results for this sub-section, including complete regression results for each of the variables is given in Appendix C.

Table 5
Growth and Foreign Financial Intermediation, 1970-79

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
DEBT average	-0.005	-0.015				
	(-0.215)	(-0.623)				
Growth of DEBT average			-0.063	-0.079		
			(-1.336)	(-1.646)		
Current account deficit					-0.084	-0.004
					(-0.942)	(-0.041)
BANK average	0.043		0.042		0.051	
	(2.245)		(2.215)		(2.521)	
PRIV/Y average		0.050		0.056		0.050
		(1.212)		(1.383)		(1.206)
R^2	0.212	0.163	0.235	0.196	0.223	0.157

Looking at Tables 5 and 6 it is apparent that the results for the 1970 decade and the 1980 decade vary greatly in terms of the affects of the proxies for foreign financial intermediation. The foreign inflow values for the 1970 decade generally have an insignificant effect on the growth rate and in fact the values of all but one of the foreign financial intermediation variables in the regressions are insignificant even at the 0.10 significance level. The values for the 1980 decade on the other hand are generally significant. This is especially true for the flow variables, which are the growth of debt and current account balance variables, and both are significant at the 0.05 level. The reason for this mainly has to do with the difference between the flow variables and the stock variables. As explained earlier, using the flow variables, the accumulated value from the previous period does not affect the current value of the variable so that this variable is only measuring the rate at which the total amount of the capital inflows are changing from one decade to the next. This is why the flow variables probably better reflect the changes throughout the decades, and are therefore better measures of the foreign financial intermediation.

Table 6
Growth and Foreign Financial Intermediation, 1980-89

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
DEBT average	-0.008	-0.007				
	(-1.786)	(-1.511)				
Growth of DEBT average			-0.138	-0.128		
			(-3.138)	(-2.903)		
Current account deficit					0.091	0.084
					(2.284)	(2.081)
BANK average	0.017		0.015		0.014	
	(1.762)		(1.622)		(1.437)	
PRIV/Y average		0.041		0.035		0.036
		(2.071)		(1.850)		(1.810)
R^2	0.472	0.483	0.526	0.532	0.490	0.500

The separate decades have an effect on the domestic financial variables that is similar to the results found in section 6.1. In every case the DEPTH variable seems to become smaller and less significant from the 1970 decade to the 1980 decade. The PRIV/Y variable on the other hand grows larger and more significant from the 1970 decade to the 1980 decade. The reason for this is probably due to the there being a higher proportion of investment towards the private financial sector in the 1980s decade. Along with the higher values for the two foreign financial flow variables, this implies that in the 1980s there was a greater effect of the foreign capital on the growth rate of a country and although there was a smaller total size of the financial sector (as DEPTH is smaller), the resources were being directed more and more towards the private sector (PRIV/Y is positive and significant).

These findings also explain the effect of β, that was indeterminate in the theoretical model. From the derivations, in section V, we saw that there was an ambiguous relationship between the share of domestic financial intermediation and the growth rate of the economy. The empirical work here shows that there is a negative and significant relationship between the foreign financial variables and the growth rate. In fact the higher

Table 7
Correlation between Growth and Stock Market Variables[a]

Variable	GY	GL	GK	StkCap	StkTO
GY	1.000				
GL	0.170	1.000			
GK	0.701	0.247	1.000		
Stock Capitalization	0.544	-0.053	0.346	1.000	
Stock Turnover	0.568	-0.034	0.491	0.821	1.000

[a] Using 1980s emerging stock market data.

value of the two flow variables in the 1980s decade suggests that there were changes taking place in the effect that capital coming into the economy was having on the rate of productivity growth. Comparing the regressions results from this sub-section to those in sub-section 6.1, it is apparent that the R^2 is higher for the regressions where a measure of the foreign financial intermediation is included. This means that the when including foreign financial flows into the model, it provides a better overall picture of the effect on the growth rate of output.

6.3 Emerging Stock Markets as measures of the Financial Sector

This sub-section adds a new measure of financial intermediation to the set of measures used by King and Levine [1993]. Using data on 24 emerging stock markets for the 1980s, I have used the empirical model used in sub-section 6.1 to see the affect on the growth rate of alternative measures of financial markets. The two measures of the emerging stock market that are used are the stock market capitalization rate (STKCAP) and the stock turnover rate (STKTO) and are defined as follows:

STKCAP: This is the total market value of domestic companies listed on the local stock markets for each economy. Source: Emerging Stock Market Database, 1994. IMF.

STKTO: This ratio is a measure of the local stock market's percentage change in the stock index adjusted in terms of US dollars. Source: Emerging Stock Market Database, 1994. IMF.

A cross-sectional sample was used, averaged over the 1980s decade, with data from 24 developing countries emerging stock markets. The use of stock market data is in many ways better than the use of the variables used earlier. This is because of the efficiency with which stock markets operate. Specifically, the stock market capitalization is a measure of the total size of the stock market and is therefore a proxy for the size of the financial market in terms of the efficiency with which it operates. The stock turnover rate is a good measure because it captures the activity in the stock market. An economy may have a large stock market but one where stocks do not frequently change hands. So a high turnover would be associated with a more active stock market and therefore more financial activity in the economy.

The results for the stock market variables are given in appendix D, where I have summarized the effects from including the STKCAP and the STKTO variables in the regressions. The coefficients on both of the stock market variables have positive signs and their coefficients are significant. These variables are good proxies for the level of development of financial markets, and the correlation between the two variables adds to the evidence supporting financial sector development in LDCs. Looking at the variables separately, we see that the model seems to fit better for the stock market capitalization rate with an R^2 value of about 0.725, when controlling for secondary school enrollment rates, Africa dummy and assassinations. The variable for the stock market turnover also has a high R^2 value at about 0.7. In comparison to measures of financial development used in sub-section 6.1, these variables fit the empirical model much better with high t-statistic values and high R^2s. However, only a 24 country sample averaged over 1 decade was used, and since only countries with stock markets can be used, this has an inherent biases in it. So only countries which already have some development in the financial sector can be included in the sample of emerging stock markets this limits the interpretation of

the results. Even then, comparing these results with DEPTH and PRIV/Y variables, for the same sample of countries, the STKCAP and STKTO still fit the model better than other variables.

VII. Conclusions

This paper takes a model of financial systems and the growth rate of output by King and Levine [1993] and develops it further to include a measure of the effect of having an open economy, where foreign financial intermediaries may lend to firms in the domestic economy. In developing the King and Levine model the paper describes four ways in which financial intermediaries increase productivity growth. It describes the need for financial intermediaries to evaluate prospective entrepreneurs and mobilize resources to finance promising projects. It also examines the role of financial intermediaries in diversifying risks and helping in the innovation activity, which leads to better products and more growth. Thus in the simple closed economy case, the need for these services leads to financial intermediaries having a positive effect on the rate of productivity growth. Allowing for the effect of foreign financial intermediaries, in an open economy model, it is less clear what the effect of the foreign financial systems would be on the growth rate of the economy. The model is developed with the amount of labor resources need to run the financial sector decreased when foreign financial markets are introduced.

The empirical work was broken down into three sections. The first used the four measures of financial intermediation used by King and Levine [1993] and added a measure of the growth of capital in the production function[13], which give results with higher R^2 than would have been obtained using the King and Levine empirical model. While the pooled cross-section time-series sample showed that all four financial variables to be significant, the separate decade data went beyond this to show that while financial depth, the measure of the total financial size, decreased, the variables measuring the share of

[13]This was implicitly assumed as in Romer [1990].

private investment increased in their effect on the growth rate from the 1970 decade to the 1980 decade, as did the share of banking activity in the financial system. The empirical work on foreign financial intermediation using the debt, growth of debt and the current account balance also gave significant results. All three variables showed that there was a negative relationship between the measures of foreign financial capital inflows and the growth rate of output in the developing economy. Moreover the data also showed that when taking the two decades separately, the effect of the foreign financial *flows* were higher for the 1980 decade than the 1970 decade.

The stock market data provides yet another measure of the effect of the financial sector on the growth rate of output. There is clearly a significant effect on the growth rate, using either of the measures of emerging stock markets. The R^2 values are also high here and this may be reflective of developing countries which have stock markets, where financial markets may already have a certain level of development.

In conclusion, this study has improved on the work by King and Levine [1993] by using a different empirical model that showed some important effects of the developing country financial system on the rate of growth of output. The work has also developed a model that describes the effect of foreign financial intermediation on the growth rate. However, further work needs to be done in this area, not only to find better measures of foreign financial intervention, but also to see the effects of the flow of foreign capital in future decades, when the long-term results of economic growth through entrepreneurship can be seen.

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Appendix A

Table A.1
Developing Country List
70 Country Sample[a]

1	DZA	Algeria	24	HND	Honduras	47	PHL	Philippines[§]
2	ARG	Argentina[§]	25	IND	India[§]	48	PRT	Portugal[§]
3	BGD	Bangladesh[§]	26	IDN	Indonesia[§]	49	RWA	Rwanda
4	BRB	Barbados	27	JAM	Jamaica[§]	50	SLE	Sierra Leone
5	BOL	Bolivia[†]	28	JOR	Jordan[§]	51	SOM	Somalia[†]
6	BWA	Botswana[†]	29	KEN	Kenya	52	LKA	Sri Lanka[§]
7	BRA	Brazil[§]	30	KOR	Korea[§]	53	SDN	Sudan[†]
8	BDI	Burundi	31	LBR	Liberia	54	SWZ	Swaziland
9	CMR	Cameroon	32	MDG	Madagascar	55	SYR	Syria
10	CAF	Cent. Afr. Rep.	33	MWI	Malawi	56	TZA	Tanzania
11	TCD	Chad	34	MYS	Malaysia[§]	57	THA	Thailand[§]
12	COL	Colombia[§]	35	MLI	Mali	58	TGO	Togo
13	COG	Congo	36	MLT	Malta[†]	59	TTO	Trin. & Tabago[§]
14	CIV	Cote D'Ivoire[§]	37	MRT	Mauritania	60	TUN	Tunisia[§]
15	DOM	Dominican Rep.	38	MUS	Mauritius	61	TUR	Turkey[§]
16	ECU	Ecuador[†]	39	MAR	Morocco[§]	62	UGA	Uganda
17	EGY	Egypt	40	NIC	Nicaragua	63	URY	Uruguay[§]
18	ETH	Ethiopia	41	NER	Niger	64	VEN	Venezuela[§]
19	GAB	Gabon	42	NGA	Nigeria[§]	65	YEM	Yemen[†]
20	GMB	Gambia	43	OMN	Oman	66	ZAR	Zaire
21	GHA	Ghana	44	PAK	Pakistan[§]	67	ZMB	Zambia
22	GTM	Guatemala	45	PRY	Paraguay[†]	68	GUY	Guyana
23	HTI	Haiti	46	PER	Peru[§]	69	BEN	Benin
						70	HVO	Burkina Faso

[a] Covers period from 1970-1989.
[†] These countries are <u>not</u> included in any of the regressions involving either BANK or PRIVATE as this data was not available for these countries in the either the 1970-79 sample, the 1980-89 sample or both, and was removed from all the regressions involving these for consistency.
[§] Only these countries are included in the Emerging Stock market data sample, for the 1980 decade.

Appendix B

Table B.1
Growth and Financial Depth

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.010	0.029	0.021	0.046	0.005	0.009
	(1.159)	(2.718)	(1.547)	(2.796)	(0.537)	(0.767)
GL	0.495	0.445	0.676	0.589	0.384	0.400
	(1.534)	(1.429)	(1.386)	(1.241)	(1.133)	(1.184)
GK	0.549	0.489	0.047	0.056	0.939	0.897
	(4.276)	(3.926)	(0.244)	(0.297)	(5.599)	(5.292)
DEPTH average	0.018	0.025	0.038	0.045	0.007	0.016
	(1.875)	(2.421)	(2.272)	(2.344)	(0.736)	(1.674)
Secondary school enrollment		-0.041		-0.057		-0.020
		(-2.949)		(-1.836)		(-1.567)
Dummy for Africa		-0.013		-0.023		0.001
		(-4.252)		(-4.389)		(0.089)
Number of assassinations		-43.756		-43.375		-28.748
		(-2.389)		(-1.395)		(-1.573)
R^2	0.1701	0.2535	0.1138	0.2114	0.3835	0.4423

Table B.2
Growth and Ratio of Deposit Bank Domestic Credit

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.003	0.018	0.020	0.036	0.000	0.006
	(0.292)	(1.591)	(1.402)	(2.089)	(0.044)	(0.477)
GL	0.444	0.395	0.826	0.635	0.187	0.224
	(1.471)	(1.327)	(1.743)	(1.336)	(0.567)	(0.673)
GK	0.392	0.334	-0.026	-0.068	0.817	0.794
	(3.229)	(2.785)	(-0.148)	(-0.385)	(4.975)	(4.757)
BANK average	0.023	0.025	0.007	0.010	0.020	0.024
	(1.880)	(2.083)	(0.365)	(0.482)	(1.617)	(1.853)
Secondary school enrollment		-0.024		-0.009		-0.018
		(-1.931)		(-0.318)		(-1.450)
Dummy for Africa		-0.012		-0.016		-0.003
		(-4.209)		(-3.681)		(-2.468)
Number of assassinations		-37.399		-35.821		-24.387
		(-2.323)		(-1.332)		(-1.433)
R^2	0.1672	0.2334	0.074	0.158	0.406	0.456

Table B.3
Growth and Financial Claims on Private Sector

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.009	0.029	0.023	0.046	0.003	0.009
	(1.037)	(2.671)	(1.540)	(2.713)	(0.360)	(0.761)
GL	0.511	0.456	0.728	0.623	0.379	0.371
	(1.583)	(1.460)	(1.452)	(1.271)	(1.129)	(1.118)
GK	0.558	0.499	0.079	0.085	0.925	0.906
	(4.342)	(4.003)	(0.394)	(0.434)	(5.590)	(5.501)
PRIV/Y average	0.033	0.049	0.043	0.051	0.023	0.044
	(1.697)	(2.245)	(1.193)	(1.220)	(1.257)	(2.169)
Secondary school enrollment		-0.043		-0.045		-0.025
		(-2.985)		(-1.374)		(-1.934)
Dummy for Africa		-0.014		-0.024		0.000
		(-4.469)		(-2.387)		(0.048)
Number of assassinations		-39.217		-43.766		-23.439
		(-2.125)		(-1.354)		(-1.310)
R^2	0.1660	0.2487	0.0599	0.1574	0.3939	0.4616

Table B.4
Growth and Claims on Non-Financial Private Sector

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.002	0.017	0.016	0.032	0.002	0.009
	(0.171)	(1.537)	(1.109)	(1.860)	(0.156)	(0.719)
GL	0.564	0.523	0.868	0.704	0.247	0.285
	(1.914)	(1.798)	(1.970)	(1.597)	(0.748)	(0.855)
GK	0.409	0.355	-0.023	-0.058	0.840	0.817
	(3.483)	(3.056)	(-0.131)	(-0.337)	(5.242)	(4.952)
PRIVATE average	0.024	0.026	0.015	0.015	0.020	0.022
	(2.243)	(2.414)	(0.891)	(0.856)	(1.666)	(1.848)
Secondary school enrollment		-0.023		-0.009		-0.018
		(-1.880)		(-0.333)		(-1.431)
Dummy for Africa		-0.012		-0.016		-0.004
		(-4.248)		(-3.678)		(-2.662)
Number of assassinations		-37.405		-35.507		-25.423
		(-2.339)		(-1.333)		(-1.497)
R^2	0.178	0.244	0.086	0.167	0.408	0.456

(1) Pooled cross-sectional time-series sample (1970-89).
(2) Pooled cross-sectional time-series sample (1970-89), controlling for secondary school, Africa and Assassin.
(3) Cross-sectional data from 1970-1979 only.
(4) Cross-sectional data from 1970-1979, controlling for secondary school, Africa and Assassin.
(5) Cross-sectional data from 1980-1989 only.
(6) Cross-sectional data from 1980-1989, controlling for secondary school, Africa and Assassin.

Table B.5
Summary Statistics for *1970-79* decade Variables[a]

Variable[b]	Mean	Std. dev.	Minimum	Maximum
GY	0.051	0.030	-0.016	0.147
GL	0.024	0.008	0.002	0.047
GK	0.028	0.019	-0.003	0.081
DEBT	0.282	0.160	0.056	0.693
GDEBT	0.119	0.083	-0.034	0.336
CURAC	-0.036	0.048	-0.221	0.080
DEPTH	0.275	0.216	0.039	1.586
BANK[c]	0.648	0.179	0.249	0.963
PRIVATE[c]	0.532	0.195	0.097	0.916
PRIV/Y	0.165	0.107	0.024	0.691

[a] Data from 70 country cross sectional sample using a 10-year average (1970-79).
[c] Use only a 62 country sample due to lack of data for PRIVATE and BANK.

Table B.6
Summary Statistics for *1980-89* decade Variables[a]

Variable[b]	Mean	Std. dev.	Minimum	Maximum
GY	0.029	0.025	-0.025	0.102
GL	0.025	0.008	0.007	0.041
GK	0.014	0.016	-0.019	0.054
DEBT	0.692	0.533	0.145	3.376
GDEBT	0.083	0.063	-0.053	0.381
CURAC	-0.051	0.061	-0.289	0.141
DEPTH	0.336	0.272	0.029	1.327
BANK[c]	0.590	0.196	0.161	0.956
PRIVATE[c]	0.459	0.202	0.051	0.875
PRIV/Y	0.186	0.137	0.021	0.684

[a] Data from 70 country cross sectional sample using a 10-year average (1980-89).
[c] Use only a 62 country sample due to lack of data for PRIVATE and BANK.

Appendix C

Table C.1
Growth and Total External Debt

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.028	0.029	0.046	0.048	0.009	0.009
	(2.698)	(2.694)	(2.776)	(2.750)	(0.765)	(0.803)
GL	0.582	0.582	0.617	0.704	0.499	0.458
	(1.869)	(1.852)	(1.244)	(1.382)	(1.485)	(1.373)
GK	0.426	0.445	0.060	0.097	0.862	0.883
	(3.404)	(3.532)	(0.315)	(0.490)	(5.150)	(5.394)
External Debt	-0.013	-0.011	-0.005	-0.015	-0.008	-0.007
	(-2.343)	(-2.061)	(-0.216)	(-0.623)	(-1.786)	(-1.511)
DEPTH	0.026		0.044		0.017	
	(2.502)		(2.243)		(1.762)	
PRIV/Y		0.044		0.050		0.041
		(2.050)		(1.211)		(2.071)
Secondary school enrollment	-0.031	-0.032	-0.056	-0.044	-0.014	-0.020
	(-2.138)	(-2.149)	(-1.772)	(-1.327)	(-1.110)	(-1.472)
Dummy for Africa	-0.009	-0.011	-0.023	-0.023	0.004	0.003
	(-1.500)	(-1.799)	(-2.284)	(-2.221)	(0.615)	(0.454)
Number of assassinations	-34.548	-31.361	-42.747	-41.658	-19.198	-15.360
	(-1.877)	(-1.686)	(-1.358)	(-1.275)	(-1.026)	(-0.831)
R^2	0.286	0.274	0.212	0.163	0.472	0.483

Table C.2
Growth and Current Account Balance

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.030	0.030	0.047	0.047	0.014	0.014
	(2.838)	(2.792)	(2.864)	(2.671)	(1.246)	(1.224)
GL	0.518	0.533	0.460	0.618	0.418	0.394
	(1.654)	(1.701)	(0.932)	(1.211)	(1.284)	(1.220)
GK	0.470	0.477	0.052	0.085	0.860	0.874
	(3.775)	(3.831)	(0.273)	(0.429)	(5.232)	(5.428)
Current Account Balance	0.070	0.076	-0.085	-0.004	0.091	0.084
	(1.558)	(1.708)	(-0.943)	(-0.042)	(2.284)	(2.081)
DEPTH	0.023		0.051		0.014	
	(2.168)		(2.522)		(1.437)	
PRIV/Y		0.045		0.050		0.036
		(2.095)		(1.205)		(1.810)
Secondary school enrollment	-0.039	-0.040	-0.065	-0.045	-0.021	-0.025
	(-2.786)	(-2.841)	(-2.018)	(-1.361)	(-1.674)	(-1.947)
Dummy for Africa	-0.012	-0.012	-0.027	-0.025	0.001	0.001
	(-1.964)	(-2.122)	(-2.565)	(-2.266)	(0.193)	(0.126)
Number of assassinations	-37.426	-32.665	-47.787	-44.000	-18.397	-14.752
	(-2.006)	(-1.746)	(-1.518)	(-1.330)	(-1.010)	(-0.825)
R^2	0.268	0.267	0.224	0.157	0.490	0.500

Table C.3
Growth and Growth of External Debt

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.034	0.034	0.052	0.053	0.018	0.018
	(3.039)	(3.028)	(3.065)	(3.055)	(1.616)	(1.602)
GL	0.446	0.454	0.625	0.664	0.354	0.336
	(1.439)	(1.466)	(1.325)	(1.373)	(1.125)	(1.076)
GK	0.501	0.512	0.026	0.049	0.954	0.965
	(4.040)	(4.131)	(0.137)	(0.253)	(6.012)	(6.173)
Growth of External Debt	-0.051	-0.057	-0.063	-0.080	-0.138	-0.128
	(-1.530)	(-1.690)	(-1.337)	(-1.647)	(-3.138)	(-2.903)
DEPTH	0.025		0.042		0.015	
	(2.375)		(2.215)		(1.622)	
PRIV/Y		0.050		0.057		0.035
		(2.313)		(1.384)		(1.850)
Secondary school enrollment	-0.042	-0.044	-0.053	-0.045	-0.019	-0.022
	(-3.022)	(-3.105)	(-1.715)	(-1.386)	(-1.571)	(-1.828)
Dummy for Africa	-0.012	-0.013	-0.020	-0.020	0.004	0.003
	(-1.987)	(-2.161)	(-1.996)	(-1.971)	(0.659)	(0.534)
Number of assassinations	-41.856	-37.045	-44.963	-44.760	-16.844	-12.990
	(-2.293)	(-2.018)	(-1.455)	(-1.406)	(-0.967)	(-0.755)
R^2	0.268	0.266	0.236	0.196	0.526	0.532

Table C.4
Growth and External Debt and Growth of Debt

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.033	0.033	0.053	0.055	0.017	0.017
	(3.021)	(3.050)	(3.069)	(3.135)	(1.515)	(1.540)
GL	0.582	0.579	0.682	0.775	0.410	0.380
	(1.878)	(1.857)	(1.380)	(1.545)	(1.278)	(1.189)
GK	0.439	0.458	0.033	0.063	0.931	0.949
	(3.517)	(3.659)	(0.171)	(0.321)	(5.780)	(5.984)
External Debt	-0.013	-0.011	-0.010	-0.021	-0.004	-0.003
	(-2.339)	(-2.054)	(-0.420)	(-0.851)	(-0.921)	(-0.717)
Growth of External Debt	-0.051	-0.056	-0.066	-0.085	-0.124	-0.117
	(-1.533)	(-1.685)	(-1.375)	(-1.738)	(-2.670)	(-2.523)
DEPTH	0.025		0.041		0.016	
	(2.456)		(2.068)		(1.696)	
PRIV/Y		0.045		0.057		0.035
		(2.119)		(1.387)		(1.818)
Secondary school enrollment	-0.031	-0.034	-0.051	-0.043	-0.016	-0.020
	(-2.210)	(-2.265)	(-1.616)	(-1.327)	(-1.293)	(-1.570)
Dummy for Africa	-0.008	-0.009	-0.019	-0.019	0.005	0.004
	(-1.258)	(-1.518)	(-1.838)	(-1.748)	(0.869)	(0.682)
Number of assassinations	-32.743	-29.310	-43.812	-41.976	-13.096	-9.985
	(-1.785)	(-1.584)	(-1.402)	(-1.308)	(-0.731)	(-0.561)
R^2	0.300	0.250	0.238	0.144	0.533	0.485

Appendix D

Table D.1
Growth and Emerging Stock Market Data[a]

Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
C	0.010	0.033	0.003	0.030	0.002	0.030
	(0.660)	(1.747)	(0.218)	(1.892)	(0.159)	(1.864)
GL	-0.010	-0.087	0.174	-0.624	0.170	0.061
	(-0.018)	(-0.142)	(0.329)	(-0.012)	(0.305)	(0.114)
GK	1.441	1.413	1.166	1.183	1.108	0.999
	(4.367)	(3.709)	(3.594)	(3.636)	(3.016)	(2.732)
Stock Market Capitalization			0.21 E-6	0.20 E-6		
			(2.281)	(3.022)		
Stock Market Turnover					0.12 E-3	0.11 E-3
					(1.757)	(2.638)
Secondary school enrollment		-0.046		-0.058		-0.062
		(-1.898)		(-2.790)		(-2.809)
Dummy for Africa		-0.012		-0.862		-0.010
		(-0.782)		(-0.658)		(-0.738)
Number of assassinations		57.161		199.629		90.523
		(0.234)		(0.959)		(0.427)
R^2	0.491	0.577	0.596	0.725	0.559	0.700

[a] Using a 24 Country Sample. See appendix A for list of the countries.
(1) Cross-sectional base regression.
(2) Base regression, controlling for secondary school, Africa and assassinations.
(3) Cross-sectional regression with stock market capitalization.
(4) Cross-sectional with stock market capitalization controlling for secondary school, Africa and assassin.
(5) Cross-sectional regression with stock market turnover.

(6) Cross-sectional with stock market turnover controlling for secondary school, Africa and assassin.

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